WIND SHIFT IN THE LOWER THREE KILOMETERS OF THE ATMOSPHERE ON THE PASSAGE OF A HIGH.

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A pilot-balloon observation made on the evening of July 8 showed an east-northeast wind in the lower regions which higher turned counter clockwise until it was northeast at 1,600 meters, directly north at 2,900 meters, and north-northwest at 4,000 meters. (Fig. 1.) The sky was cloudless except for the presence of a few Cu. On July 9, at 6:45 a. m., seventy-fifth meridian time, a few St.Cu. were rising over the horizon in the north and northeast, and in the foreground, toward the northeast, a small patch of Fr.Cu. was traveling from the west.

At this time a pilot balloon run was made. (Fig. 2.) Upon release the balloon swung toward the west and then clockwise to the north and north-northeast. At the height of about 600 meters, the velocity of the balloon suddenly increased from 5 meters per second to 9 meters per second and headed directly toward the St.Cu. in the northeast, which were coming up very rapidly over the horizon. At the altitude of 1,500 meters, the balloon swung sharply to the east and was then in the layer of air which was carrying the patch of Fr.Cu. from the west. The balloon continued swinging to the right until at the height of 2,300 meters it was coming from the north-northwest. At this altitude the balloon disappeared in the St.Cu. cloud. Had it been possible to follow the balloon several minutes longer, it would undoubtedly have shown a north-northeast wind, the wind direction obtained by cloud observation. By this time 15 minutes had elapsed and the sky was seven-tenths covered with St.Cu., all coming from the north-northeast. These blew over in about 30 minutes leaving a practically clear sky with only a thin light layer of A.St. covering most of the sky. The sky soon clouded over again with a St.Cu. layer moving from the south, which was predominant the remainder of the day.

On the evening of the 9th southwest winds were blowing to a height of about 600 meters, and south winds from this height to 1,800 meters, the altitude at which the balloon disappeared into the St.Cu. then covering the sky. (Fig. 3.)

The weather map of July 9, 8 a. m., showed the axis of a HIGH extending over the middle and north Atlantic coast, with a maximum pressure of 30.38 inches at Atlantic City, Block Island, and Nantucket. A LOW was passing over the Canadian northwest, with a minimum pressure of 29.72 inches at Winnipeg, Man.

With the advance of this LOW during the night, a southerly wind, overriding a thin, cool, surface east wind, pushed in under the northerly wind of the anticyclone. In doing so an intermediate west wind was induced and heavy St.Cu. were formed largely by convection where the comparatively warm, west wind and the cooler northeast wind came into contact. Then the southerly winds kept on pushing up until the west wind was eliminated; and, apparently, when it came into contact with the colder northerly winds, St.Cu. formed, probably on the boundary, with at least their under surfaces in the south wind. These clouds were present for the remainder of the day.

FIGS. 1, 2, 3.—Altitude-direction graphs from pilot-balloon flights, July 8-9, 1919, at Aberdeen, Md.